



NEOCARE

RPPG BASED NEONATAL HEALTH MONITORING SYSTEM

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Previous Team

Neonatal Heart Rate Estimation
on NBHR Dataset

**lowest MAE
lowest MAPE**

Neonatal SpO2 Level Estimation
on NBHR Dataset

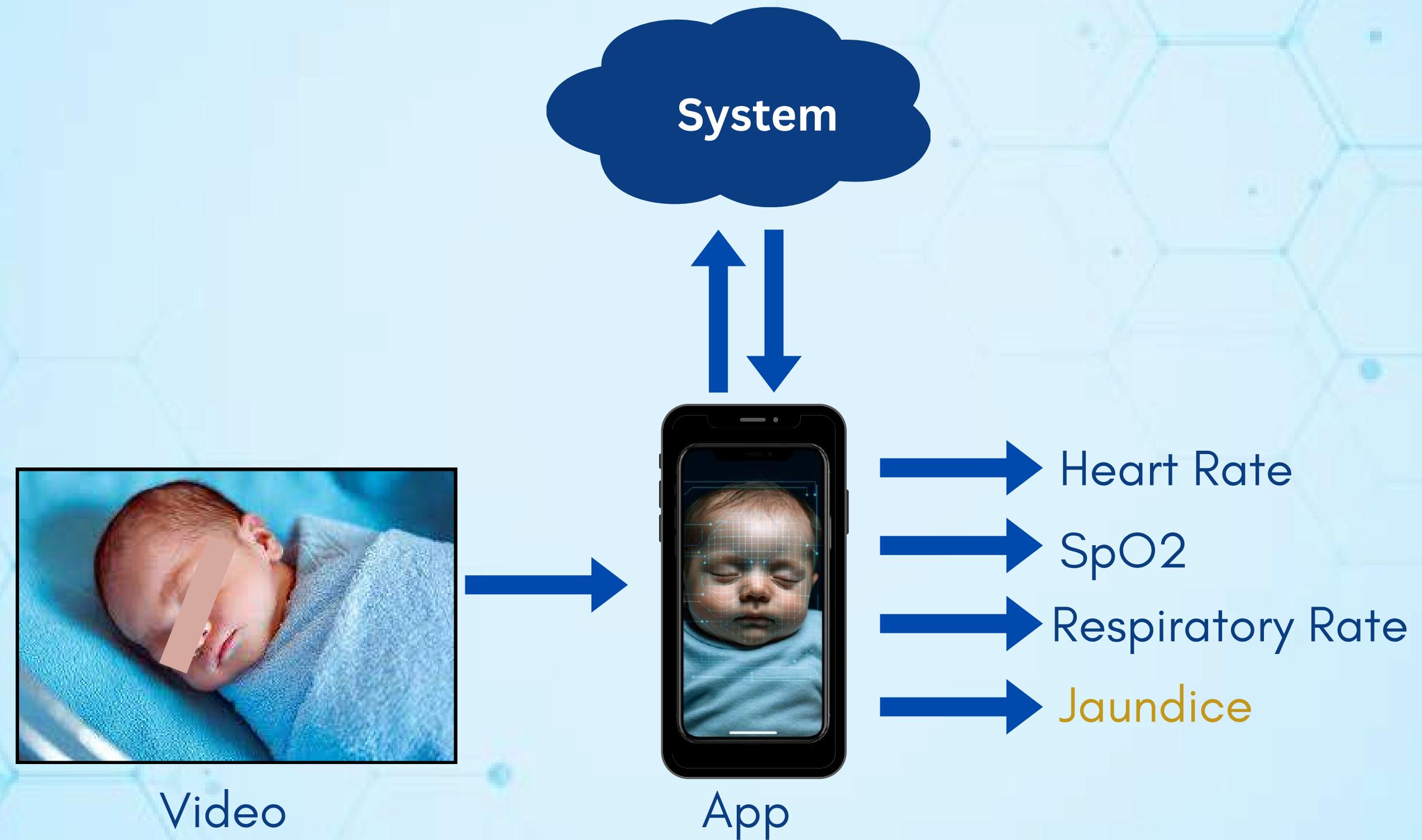
**lowest MAE
lowest RMSE**

Neonatal Facial Video Dataset

VideoPulse



PROPOSED APPROACH



JAUNDICE



- Excess bilirubin in the blood
- Newborns and premature babies
- Yellowing of skin and eyes
- Brain damage (kernicterus) if untreated



RESEARCH GAPS

Few researches on neonates

1

Skin tone bias for lighter skin colors

2

Low explainability

3

No system with multiple output including Spo2, HR, RR and Jaundice

4

Motion and segmentation

5

No models or datasets that are collected by mobile phones for neonatal rppg estimation

6

Lack of methods that preserve the privacy

7



DELIVERABLES

Enhance existing non-contact, video-based algorithms to accurately estimate HR, SpO₂, RR, jaundice status in neonates

Create a new dataset specifically for neonates to validate these algorithms

Mobile application for contactless monitoring of neonates



NOVELTY



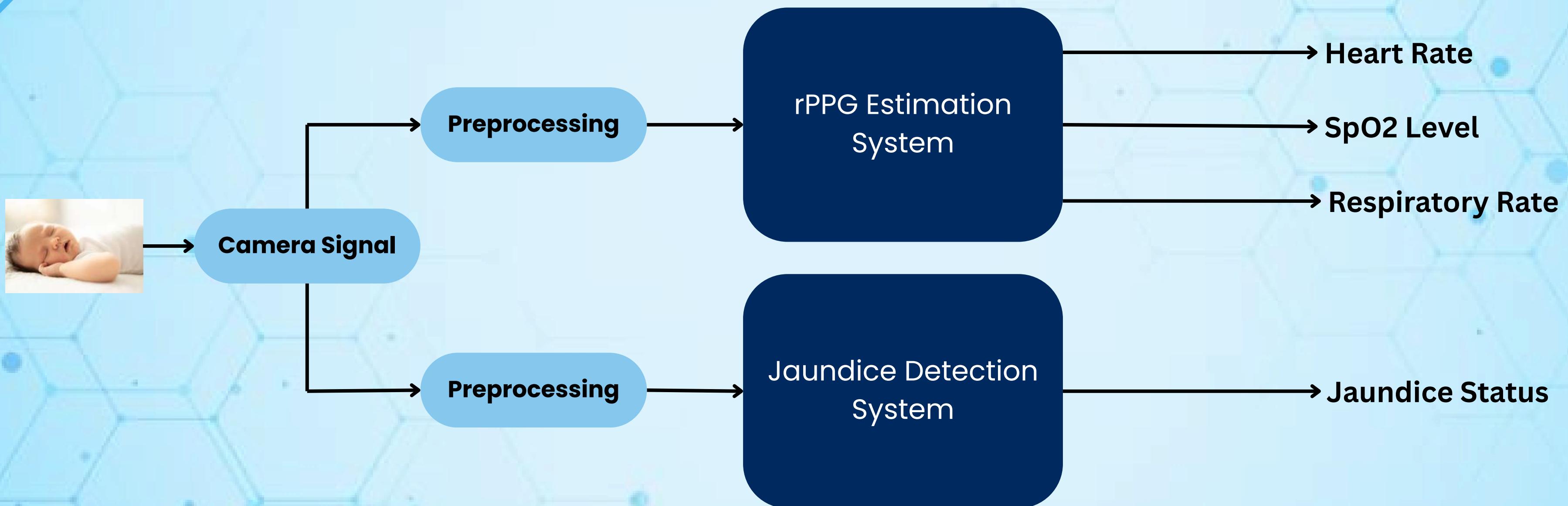
First method on neonatal respiratory rate prediction
using non invasive methods

First mobile app to embed several vital signs including
RR, HR, SpO2 level for neonates

Creating a new dataset on neonates that supports
HR, SpO2 and RR



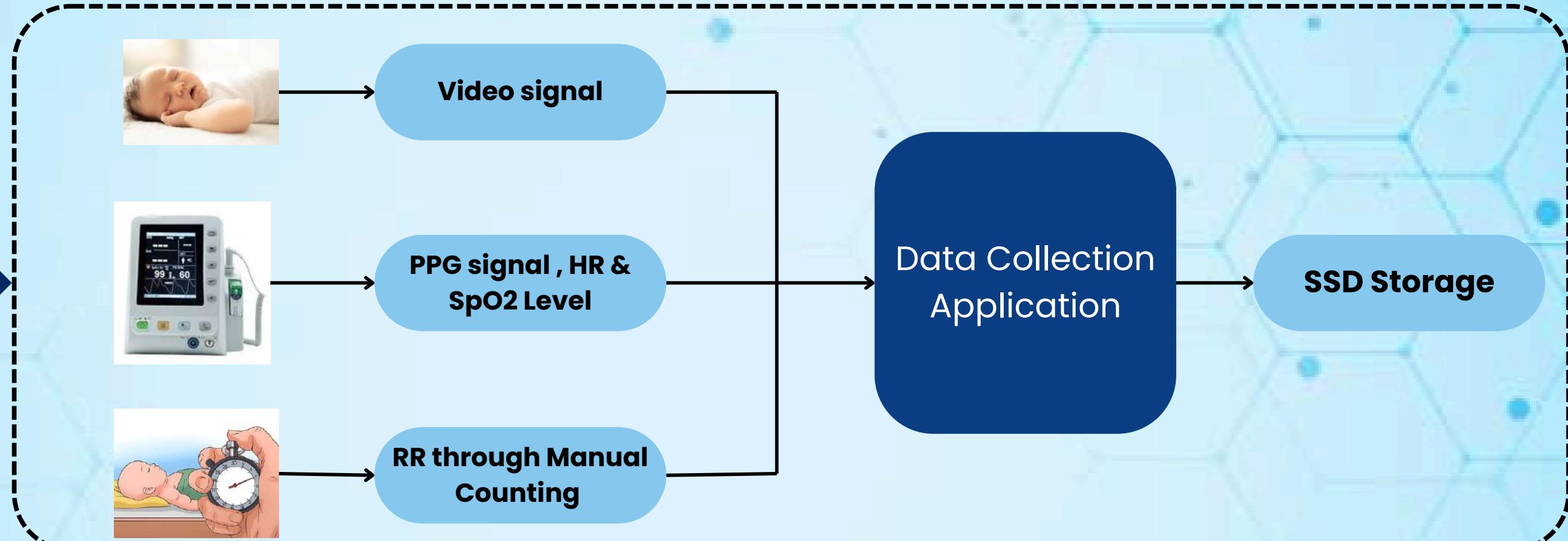
Algorithm Development



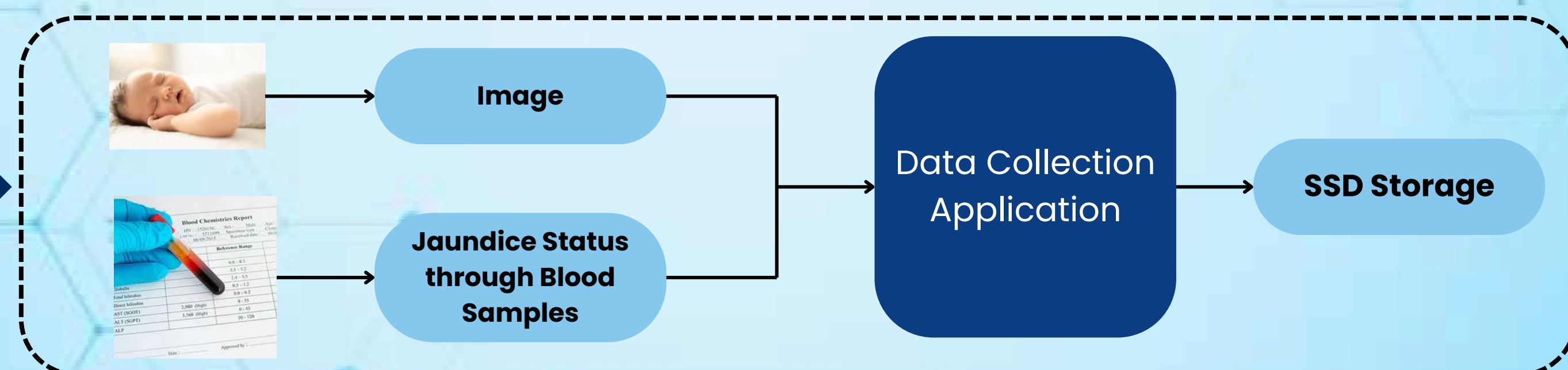


Data Collection Process

rPPG



Jaundice Status



CURRENT PROGRESS



Ethical Clearance



All documents submitted and waiting for the approvals



Hospital Investigation



At De Soysa Hospital for Women



Discussed with Dr. Nishani Lucas about the data collection and the practical procedures of detecting jaundice and other vital signs.



Dataset Investigation



rPPG

- NBHR
- VideoPulse ✓

Jaundice

- NJN ✓
- NJA ✓

Huang, Bin & Chen, Weihai & Lin, Chun-Liang & Juang, Chia-Feng & Xing, Yuanping & Wang, Yanting & Wang, Jianhua. (2021). A neonatal dataset and benchmark for non-contact neonatal heart rate monitoring based on spatio-temporal neural networks. *Engineering Applications of Artificial Intelligence*. 106. 104447. [10.1016/j.engappai.2021.104447](https://doi.org/10.1016/j.engappai.2021.104447).

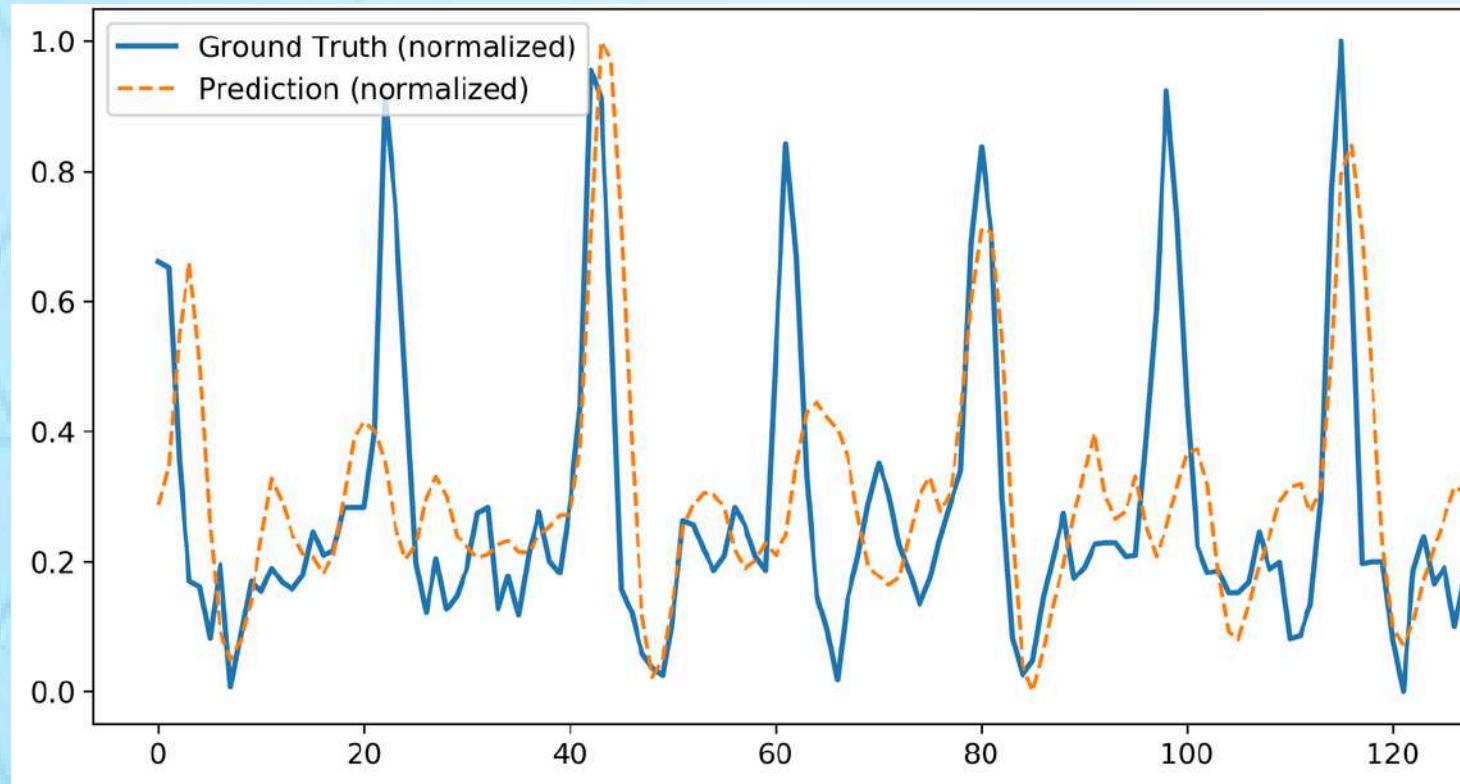
Abdulrazzak, A. Y., Mohammed, S. L., & Al-Naji, A. (2023). NJN: A Dataset for the Normal and Jaundiced Newborns. *BioMedInformatics*, 3(3), 543–552.
<https://doi.org/10.3390/biomedinformatics3030037>

Makhloghi, F., Sadeghi Bajestani, G., & Faramarzi, R. (2024). Neonatal Jaundice Assessment: A Dataset of Forehead and Sternum Images for Bilirubin Estimation (Version1) [Dataset]. Mendeley Data. <https://doi.org/10.17632/yfsz6c36vc.1>

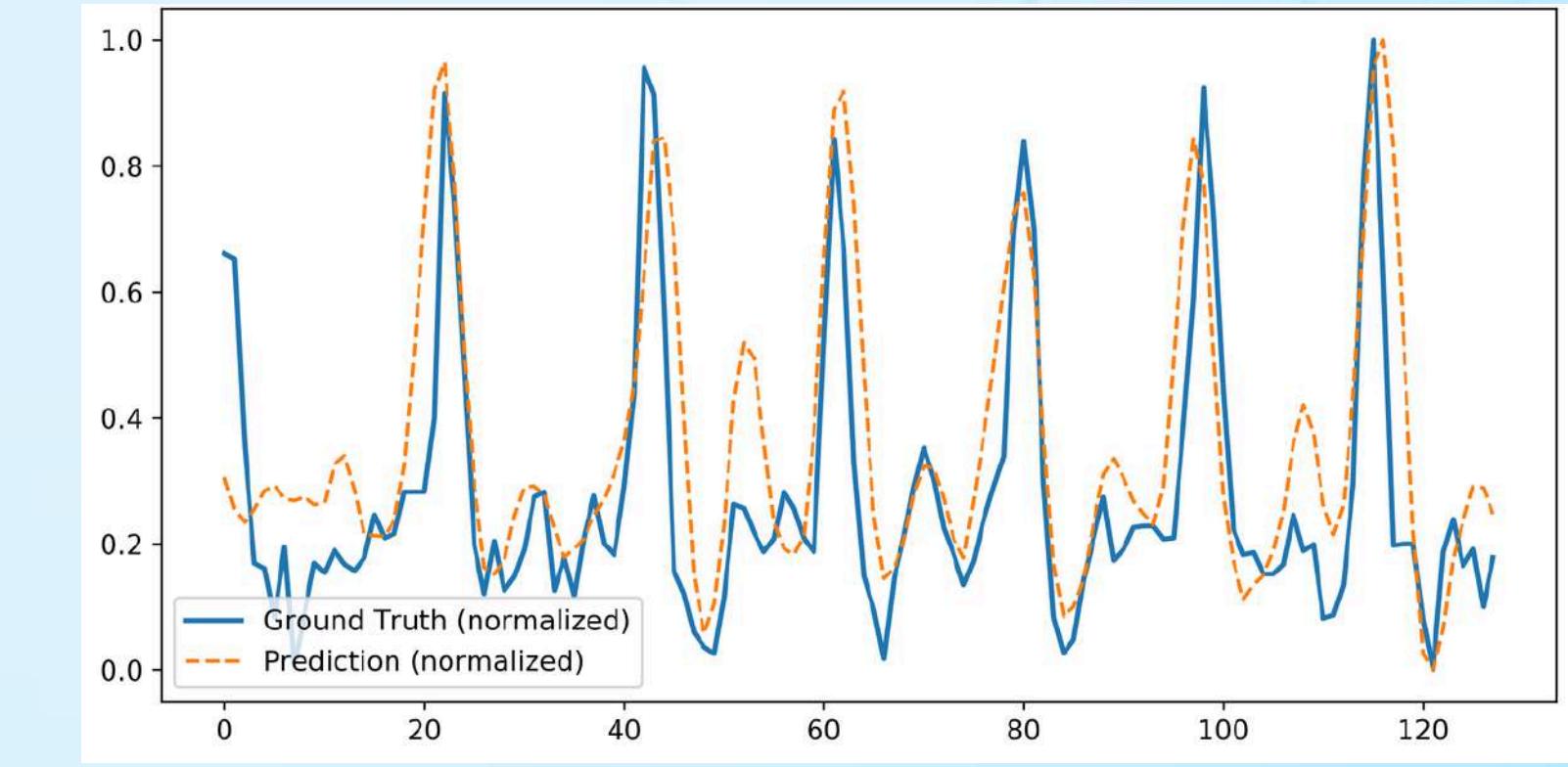


rPPG Toolbox

- Evaluated PhysMamba and PhysNet using the rPPG toolbox.
- We used UBFC-rPPG dataset (adults) and NBHR/VideoPulse datasets (neonates)
- PhysMamba outperformed PhysNet in signal reconstruction



rPPG signal from Physnet Model

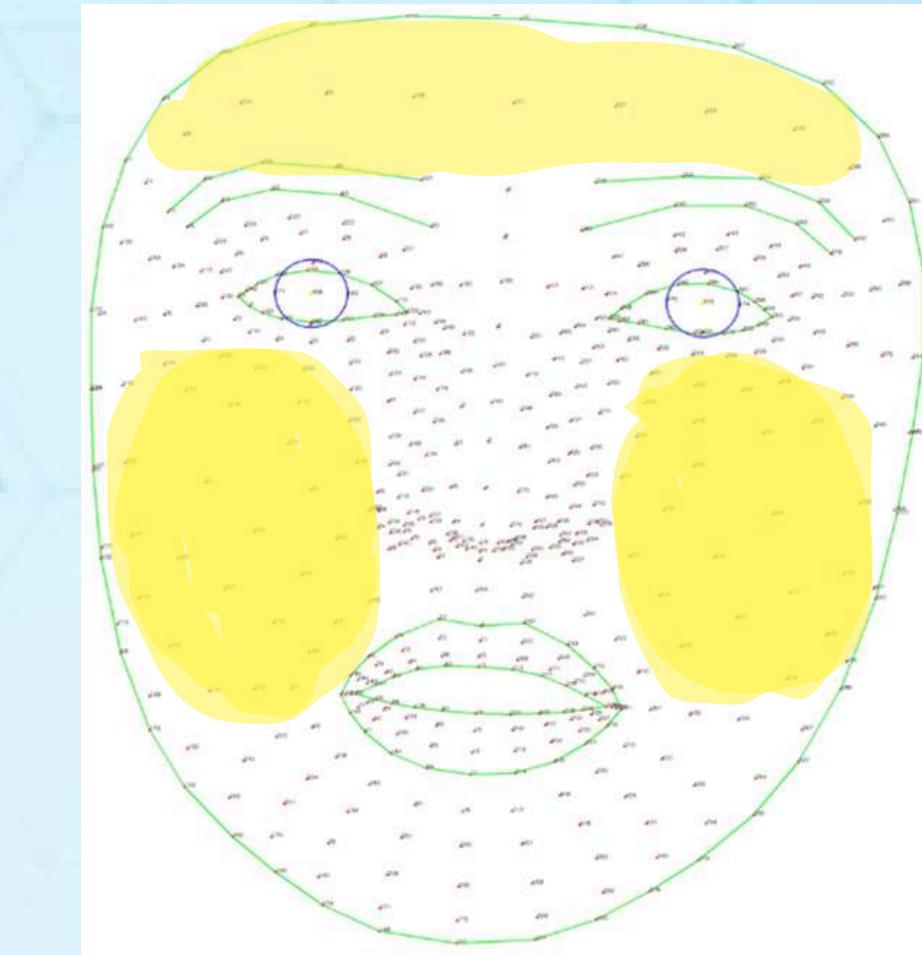


rPPG signal from PhysMamba Model



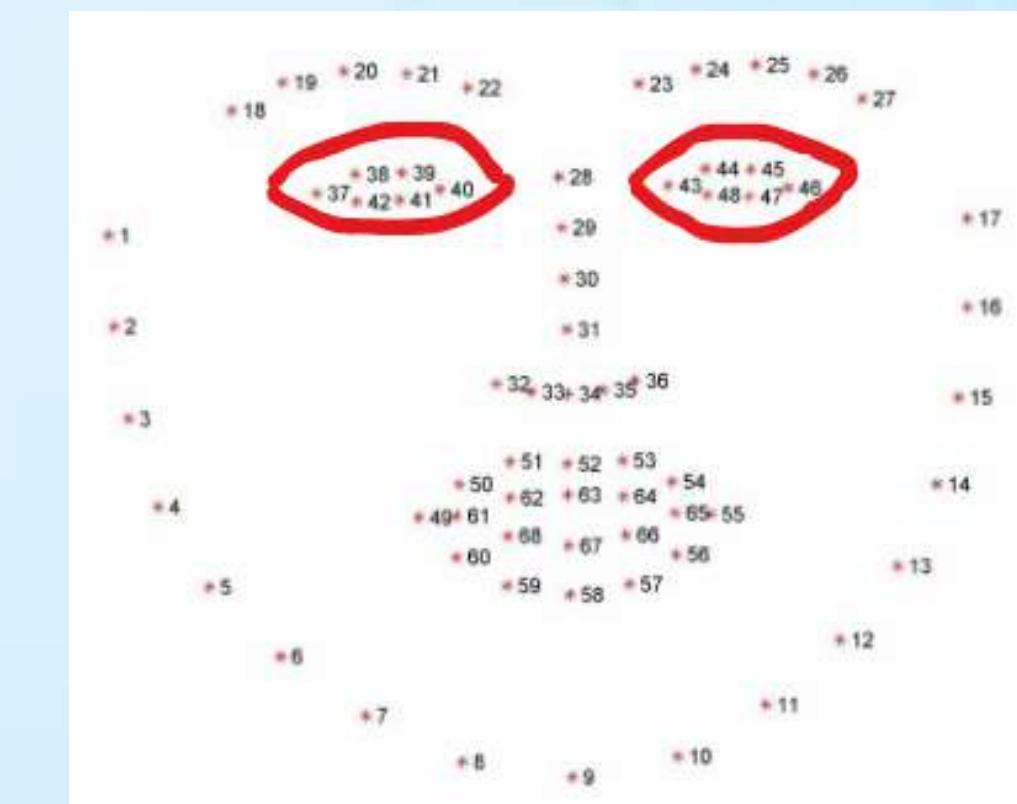
ROI Selection

- Detect forehead and cheeks
- Mediapipe 468-point facemesh
- landmarks 234–243 => left cheek
landmarks 454–463 => right cheek
landmark 1–5, 152–159 => forehead



Privacy Preserving

- Dlib's 68-point model – detect eye coordinates and blur them
- landmarks 36–41 => left eye
landmarks 42–47 => right eye





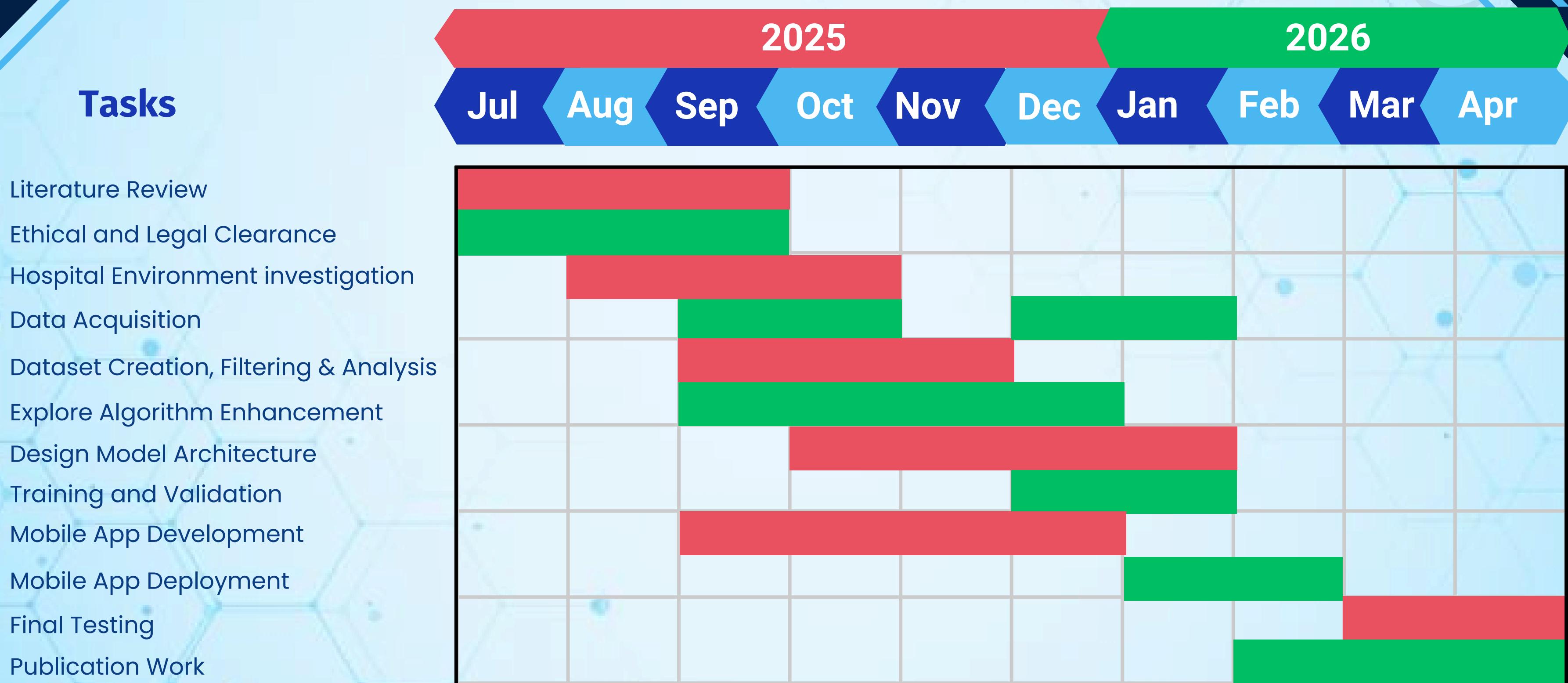
Jaundice Detection

MobileNet v5

- Lightweight & efficient → optimized for mobile/edge devices, ideal for smartphone-based medical apps.
- Tested with MobileNetV5 backbone as the classifier for jaundice detection.
- Need to Fine-tune to adapt to jaundice vs. non-jaundice classification
- Tested inference on sample facial images to evaluate detection capability.



Time Line



THANK YOU